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ABSTRACT

As part of a 90-hour community college course in sheet metal working, this 50-minute lesson was designed to enable a student to: (1) identify and use right and left hand aviation snips; (2) cut out a 6-inch round opening in a piece of sheet metal using aviation snips; and (3) cut out a 6-by-6 inch square opening in a piece of sheet metal using aviation snips. The lesson plan includes information on the course for which the lesson was designed; equipment and audiovisual aids needed; requirements for student materials; course objectives; bibliographic references; and special remarks for the instructor. Next, a step-by-step outline of the teachers' presentation is provided in a format indicating the length of time and the equipment or other aids necessary for each step of the lesson. Handouts and transparency masters are included. (PAA)

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HOW TO CUT A ROUND AND A SQUARE INSIDE OPENING IN A PIECE OF SHEET METAL USING AVIATION SNIPS

Sheet Metal 1-001,
Lesson Plan No. 2

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LESSON PLAN

LESSON PLAN NO.	INSTITUTION / AGENCY:	PAGE
2	Honolulu Community College	PAGE 1 OF 14 PAGES

COURSE OF INSTRUCTION AND COURSE NUMBER:	TOTAL HOURS:	LESSON TITLE:
Sheet Metal 1-001	90	How to cut a round and a square inside opening in a piece of sheet metal using aviation snips.

DAY AND DATE OF INSTRUCTION:	HOURS	PLACE:
Thursday, November 13, 1986	6:30 - 7:20 p.m.	University of Hawaii, Manoa, Wist 112

NO. OF STUDENTS:	REHEARSAL:	INSTRUCTOR AND ASSISTANTS:	STUDENT MATERIALS AND DRESS:
8		Guy T. Shibayama	Casual dress with covered shoes.

REFERENCES:

Meyer, Leo A. Sheet Metal Apprentice Workbook 1 Volume I National Training Fund For The Sheet Metal And Air Conditioning Industry, Revised August 1985, Section IV Shopwork, Unit 2 Hand Tools, pp. 1-6

EQUIPMENT AND AUDIO-VISUAL AIDS:

1. Overhead projector
2. Overhead transparency No. 1 & 2
3. Mock-up of duct with branch tap
4. Straight and combination snip
5. 8 pairs right hand aviation snip
6. 8 pairs left hand aviation snip
7. 20 pieces 10" X 10" 26 ga. galv. sheet metal
8. Screen
9. Marker pens.
10. Flipchart
11. Tripod
12. Pointer
13. First aid kit

OBJECTIVES:

At the end of 50 minutes, the student will be able to:

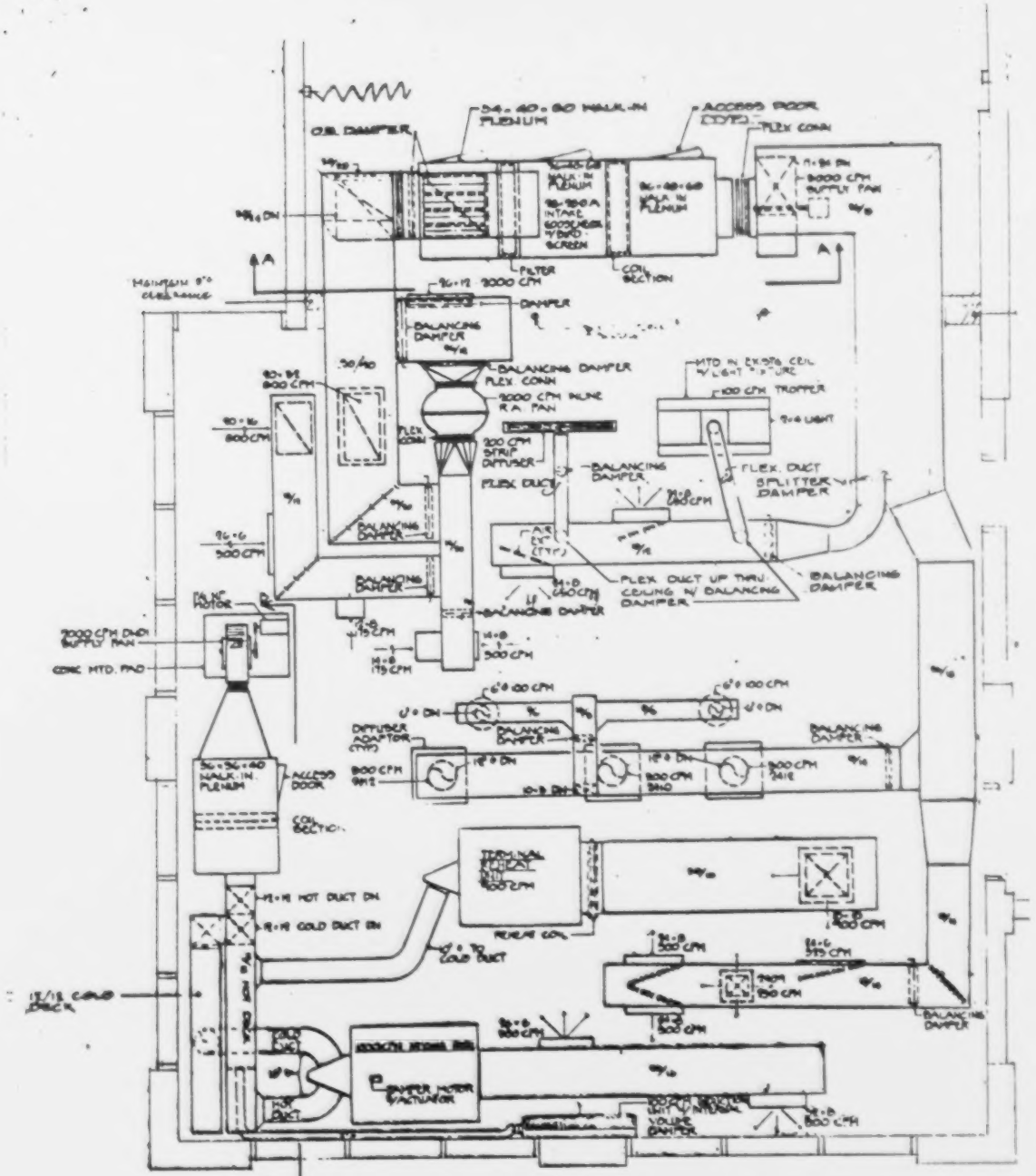
1. Identify and use a right hand and left hand aviation snip.
2. Cut out a 6" round opening using aviation snips.
3. Cut out a 6" X 6" square opening using aviation snips.

SPECIAL REMARKS:

This is a lesson for first year community college students majoring in sheet metal. It is used as an introduction to the hand tools used in the sheet metal trade.

PRESENTATION

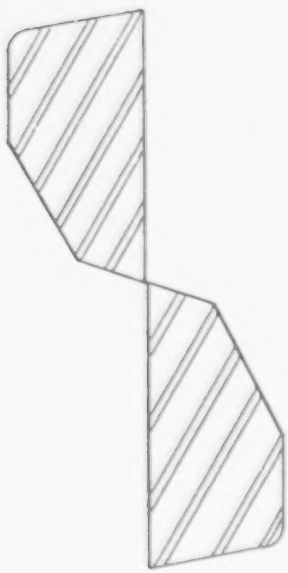
OUTLINE OF INSTRUCTION	TIME	METHODS OF INSTRUCTION AND AIDS
I. INTRODUCTION	5 min.	
A. Today we are going to learn how to use a left hand aviation snip and a right hand aviation snip to cut out an inside round and an inside square opening.		
B. The purpose for this lesson is to introduce you to the tools and skills that you will need to cut openings in air conditioning ducts for installing taps of branch ducts and air outlets. This is one of the skills you will need to develop in order to perform your work as an apprentice.		Show overhead transparency of blueprint. Explain blueprint to students and point out branch and drop locations. Show mock-up of duct with round and square taps attached.
C. This skill is one of many that you will acquire during your course of study in this program. The reason for acquiring this particular skill is that when you complete this course you will most likely get a job in the sheet metal industry. The ability of your employer to compete in this highly competitive industry may very well depend on the speed and accuracy in which you perform these skills. Your success as a sheet metal worker may also depend on how well you perform these skills.		
D. At the end of the session, I will expect you to identify and use a left hand aviation snip and a right hand aviation snip. You will also be expected to cut out a six inch round and a six inch square inside opening in a piece of sheet metal using aviation snips.		


MAINTAIN 8" CLEARANCE
FILTER
COIL SECTION
BALANCING DAMPER
FLEX CONN
FLEX DUCT
ACCESS DOOR
COIL SECTION
HOT DUCT DN
COLD DUCT DN
COLD DUCT
HOT DUCT
BALANCING DAMPER
FLEX. DUCT SPLITTER DAMPER
FLEX DUCT UP THRU CEILING W/ BALANCING DAMPER
DIFFUSER ADAPTOR
BALANCING DAMPER
BALANCING DAMPER
BALANCING DAMPER

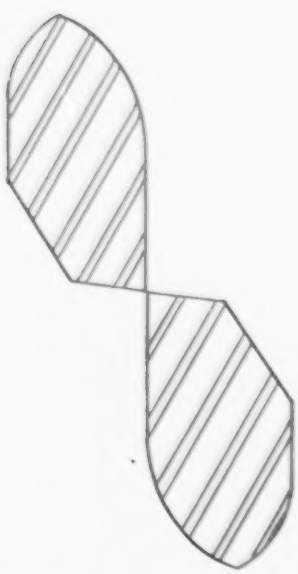
PRESENTATION

OUTLINE OF INSTRUCTION	TIME	METHODS OF INSTRUCTION AND AIDS
E. Before we go on, let's review what we covered on the last lesson about snips. Remember how we discussed the straight blade and the combination blade snips. Do you recall the advantage of the combination snip's curved blade over the straight snip's flat blade which allows the cut metal to flow over the blade when cutting curved lines? Well, the aviation snip has the same curved blade which makes it ideal for cutting curves.		Show overhead transparency No. 2 displaying cross section of the two types of snip blades. Show combination blade and straight blade snips.
III. EXPLANATION	43 min.	
A. When the journeyman that you will be working with asks you for a left hand snip, you are not being kidded. There are such things as right hand and left hand snips. When right hand snips are held in the cutting position, the upper blade is on the cutter's right, conversely, when left hand snips are held in the cutting position, the upper blade is on the cutter's left. In general, left hand snips are used to cut in a clockwise direction and right hand snips are used to cut in a counter clockwise direction when cutting out inside openings. Another way to identify aviation snips, providing the grips of the handles have not been switched, is that the right hand snip has red rubber grips on the handle and the left hand snip has green rubber grips on the handle. Are there any questions?	(5 min.)	Show and tell with aviation snips.

OVERHEAD TRANSPARENCY #2



STRAIGHT FACE
BLADE



CURVED FACE
BLADE

PRESENTATION

OUTLINE OF INSTRUCTION	TIME	METHODS OF INSTRUCTION AND AIDS
Questions: 1. When cutting out inside openings, in which direction is the right hand snip normally used to cut? Answer: In a counter clockwise direction. 2. When the upper blade is on the cutter's left, which snip is being used? Answer: The left hand snip.		
B. Before we begin cutting, let's discuss some safety tips and cutting mechanics of the aviation snips.	(5 min.)	
1. First the safety tips. Anytime you work with tools which use a pinching or shearing action and materials with sharp edges, there is a possibility of injuring yourself. One area that you should be wary of is the snip itself. If you are not careful it does not take much to cut your finger. Another hazard is the metal that is removed when you make the cut. This has sharp points that can cut you very easily. The final hazard is the cut itself. If you do not cut the metal properly, you form what are called fishhooks which could snag your finger.		Show pinch points on snips, samples of metal spirals with sharp points, and fishhooks.

PRESENTATION

OUTLINE OF INSTRUCTION	TIME	METHODS OF INSTRUCTION AND AIDS
2. Now for the mechanics of cutting with aviation snips. Hold the snip at the proper angle when attempting to cut. The correct angle to hold the right hand snip when cutting is at about a one o'clock position. The correct angle to hold the left hand snip is at about an eleven o'clock position.		Demonstrate the correct angle to hold aviation snips. Note that snip should not be held plumb or straight up and down.
3. Do not cut to the end of the snip blade. This makes a nick in the metal and makes resetting the blade of the snip in the cut necessary.		Demonstrate showing formation of nicks on metal.
4. After completing a cut, push the snip accurately into the end of the cut before starting another. This prevents the formation of fishhooks that may injure you.		Demonstrate showing formation of fishhooks.
5. Whenever possible, keep the smallest piece of metal over the bottom blade of the snip. This allows the small metal to roll off the bottom blade making pushing the snip forward easier.		Demonstrate showing smaller piece of metal curling away. Also demonstrate difficulty of attempting to cut with large piece of metal over the bottom blade.
6. Trim off large pieces of metal before making a cut to the finish cut line. This enables the small piece of metal to curl up and out of the way making it easier to follow the line.		
Are there any questions?		

PRESENTATION

OUTLINE OF INSTRUCTION	TIME	METHODS OF INSTRUCTION AND AIDS
Questions: 1. What is the reason for not making cuts to the end of the snip blade? Answer: Because this forms nicks in the metal. 2. Why is it necessary to push the snip accurately into the end of the cut before starting another? Answer: To prevent the formation of fishhooks. 3. Why do you want to keep the smallest piece of metal over the bottom blade when cutting? Answer: It allows the smaller metal to curl away and makes pushing the snip forward easier.		Ask students questions to check for understanding.
C. Let's start with the round opening. You may use either the left hand or the right hand aviation snip. 1. Starting from the center, place the snip into the starter opening provided and cut away the excess metal in a spiral cut outwards to about one half inch of the finish cut line.	(3 min.)	Pass out job sheet on cutting openings to students. Demonstrate cutting opening with aviation snip. Show the hazards of the cut metal as they form during cutting demonstration.

HANDOUT NO. 1

NAME _____
Last First

JOB SHEET NO. 1 CUTTING A ROUND AND A SQUARE OPENING

I. EQUIPMENT

A. Right hand aviation snip.

B. Left hand aviation snip.

C. Two pieces 10" X 10" 26 GA. sheet metal blanks.

II. PROCEDURE FOR ROUND OPENING

A. Place jaw of snip in starter opening.

B. Cut in spiral motion outward to about one half inch of the finish cut line.

C. Remove the excess metal.

D. Cut in circular motion on finish line until cut is complete.

III. PROCEDURE FOR SQUARE OPENING

A. Place jaw of snip in starter opening.

B. Cut away excess metal in a spiral motion outwards from the center to about one half inch of the finish cut line.

C. Place the right hand snip about midpoint between two corners of the square.

D. Make an angle cut in a counter clockwise direction slowly turning the snip until you reach the finish cut line.

E. Continue cutting on the finish line stopping at the corner.

F. Place the left hand snip about midpoint of the side opposite of the cut just completed.

G. Make an angle cut in a clockwise direction slowly turning the snip until you reach the finish cut line.

H. Continue cutting on the finish cut line until you reach the corner.

I. Repeat steps C, D, E, F, G, and H until all the corners are removed.

PRESENTATION

OUTLINE OF INSTRUCTION	TIME	METHODS OF INSTRUCTION AND AIDS
2. After removing the excess metal, proceed to trim the metal to the finish cut line in a circular motion until the opening is complete. (Review main points.) a. Make a spiral cut outwards from the center removing the excess metal to within one half inch of the finish cut line. b. Trim on the finish cut line in a circular motion until the opening is complete. Are there any questions regarding cutting of round openings?		
D. Now we will practice cutting out a round opening together. 1. Place the jaw of your snip in the starter opening provided in the sheet metal and begin cutting in a circular motion outward to about one half inch of the finish cut line. 2. After you have completed removing the excess metal, begin cutting on the finish cut line in a circular motion until the cut is complete.	(10 min)	Pass out a pair of aviation snips and a sheet metal blank to each student. Cut opening together with students and monitor their progress. Watch for proper cutting position of snip.

PRESENTATION

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E. Let's go on to the second part of this lesson which is cutting out a square opening. Again, you may use either the left hand or right hand aviation snip.	(5 min.)	
1. Starting from the center, place the snip into the opening provided and cut away the excess metal in a spiral pattern outwards to about one half inch of the finish cut line.		Demonstrate cutting opening using aviation snip.
2. After the excess metal is removed, place the right hand snip about midway between two corners. Make an angle cut in a counter-clockwise direction slowly turning the snip until you reach the finish cut line. Continue cutting on the finish cut line until you reach the corner.		
3. Take your left hand aviation snip and place it about center of the corners on the side opposite the cut that was just completed. Make an angle cut again, this time in a clockwise direction, slowly turning the snip until you reach the finish cut line. Continue cutting on the finish cut line until you reach the corner. That completes one fourth of the cut.		
4. Repeat steps two and three until all the corners are removed. You may experience some difficulty starting the cut at the point where the other cut met the finish		

PRESENTATION

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cut line but with practice you will soon be experts. Remember, be careful not to cut yourself on the sharp edges you create during cutting. (Review main points.) a. Place the snip in the opening provided and cut outwards in a spiral motion from the center to about one half inch of the finish cut line. b. With the right hand snip, make a slanted cut in a counter-clockwise direction to the finish cut line and continue cutting on the finish cut line stopping at the corner. c. Take the left hand snip and make a slanted cut in a clockwise direction to the finish cut line and trim to the corner from the opposite direction. d. Repeat the procedure of trimming on the finish cut line to the corner until all the cuts are complete. Are there any questions regarding cutting of square openings?		
F. Now we will practice cutting a square opening together.	(15 min.)	Pass out sheet metal blank to students.

PRESENTATION

OUTLINE OF INSTRUCTION	TIME	METHODS OF INSTRUCTION AND AIDS
1. Take your right hand snip and place the jaw of the snip in the opening provided in the sheet metal. Begin removing the excess metal in a spiral cut outwards to about one half inch of the finish cut line.		Cut opening step by step along with students and monitor their progress.
2. After you complete removing the excess metal, take your right hand snip and place it about midpoint between two corners. Make a slanted cut in a counter-clockwise direction slowly turning the snip until you reach the finish cut line. Continue to trim in a counter-clockwise direction stopping at the corner.		
3. Now take your left hand snip and start another slanting cut from the other direction about midpoint of the corners. Cut on the finish cut line in a clockwise direction stopping at the corner.		
4. Repeat this process for the remaining three corners.		
III. SUMMARY	2 min.	
A. Before we conclude this lesson, may I repeat its purpose. Cutting openings is one of the many skills that you are required to master as a sheet metal worker. I encourage you to take the time now to master this skill while you are still students. The contractor who will eventually hire		

PRESENTATION

OUTLINE OF INSTRUCTION	TIME	METHODS OF INSTRUCTION AND AIDS
you will expect you to have mastered this basic skill before you begin to work for him. Are there any questions? If there are no further questions, class is dismissed. See you next week.		

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